

WHAT IS CLAIMED IS:

1. A gas laser device, comprising:
a chamber for sealingly storing a laser gas
therein;

5 a discharging electrode for exciting the
laser gas through electric discharging, so that laser
light is outputted from said chamber;

10 circulating means for circulating the laser
gas within said chamber so that the laser gas passing
an electric discharging region of said discharging
electrode is circulated in said chamber and is
returned to said electric discharging region of said
discharging electrode; and

15 control means for controlling said
circulating means so that said circulating means
provides different gas circulation capacities, being
different for an in-operation state in which the laser
gas is excited by electric discharging from said
discharging electrode and the laser light is outputted
20 and for a stand-by state which differs from said in-
operation state but in which laser light can be
outputted.

25 2. A gas laser device according to Claim 1,
wherein said control means is operable to stop the gas
circulation through said circulating means when said
gas laser device is in said stand-by state.

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3. A gas laser device according to Claim 2,
wherein said circulating means includes a blowing
machine provided within said chamber.

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4. A gas laser device according to Claim 3,
wherein said blowing machine has a blowing blade
rotatably supported within said chamber.

10 5. A gas laser device according to Claim 1,
wherein said laser device comprises one of a noble gas
halide excimer laser and a F₂ laser.

15 6. A gas laser device according to Claim 5,
wherein said noble gas halide excimer laser comprises
one of XeCl excimer laser, KrF excimer laser, and ArF
excimer laser.

20 7. A gas laser device according to Claim 1,
further comprising an exposure apparatus for exposing
a substrate with the laser light.

25 8. A gas laser device according to Claim 7,
wherein said control means is operable to stop the gas
circulation through said circulating means when said
gas laser device is in said stand-by state.

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9. A gas laser device according to Claim 8,
wherein said circulating means includes a blowing
machine provided within said chamber.

10. A gas laser device according to Claim 8,
wherein said blowing machine has a blowing blade
rotatably supported within said chamber.

11. A gas laser device according to Claim 8,
wherein said laser device comprises one of a noble gas
halide excimer laser and a F₂ laser.

12. A gas laser device according to Claim 11,
wherein said noble gas halide excimer laser comprises
one of XeCl excimer laser, KrF excimer laser, and ArF
excimer laser.

13. An exposure apparatus, comprising:
a laser light source having (i) a chamber for
sealingly storing a laser gas therein, (ii) a
discharging electrode for exciting the laser gas
through electric discharging so that laser light is
outputted from said chamber, and (iii) circulating
means for circulating the laser gas within said
chamber so that the laser gas passing an electric
discharging region of said discharging electrode is
circulated in said chamber and is returned to said

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electric discharging region of said discharging
electrode; ¹²

a main assembly for exposing a substrate with ¹³
the laser light from said laser light source; and

5 control means for controlling said ¹⁵
circulating means so that said circulating means
provides different gas circulation capacities, being ¹⁷
different for an exposure-operation state of said
exposure apparatus in which exposure of the substrate
10 with the laser light from said laser light source can ²⁰
be performed through said main assembly, and for a
non-exposure-operation state of said exposure
apparatus.

15 14. An apparatus according to Claim 13, wherein
said control means is operable to increase the gas
circulation capacity of said circulating means in
response to start of an exposure job in which the
exposure operation is performed through said main
20 assembly.

15. An apparatus according to Claim 14, wherein
said control means is operable to hold gas circulation
through said circulating means stopped before start of
25 the exposure job.

16. An apparatus according to Claim 15, wherein

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wherein said circulating means includes a blowing machine provided within said chamber.

17. An apparatus according to Claim 16, wherein said blowing machine has a blowing blade rotatably supported within said chamber.

18. An apparatus according to Claim 13, wherein said laser light source comprises one of a noble gas halide excimer laser and a F₂ laser.

19. An apparatus according to Claim 18, wherein said noble gas halide excimer laser comprises one of XeCl excimer laser, KrF excimer laser, and ArF excimer laser.

20. A semiconductor device manufacturing method in which a pattern is lithographically transferred onto a substrate by use of an exposure apparatus as recited in any one of Claims 7 - 19.